The Pro Kerb

CKC Civil Construction Equipment Pty Ltd

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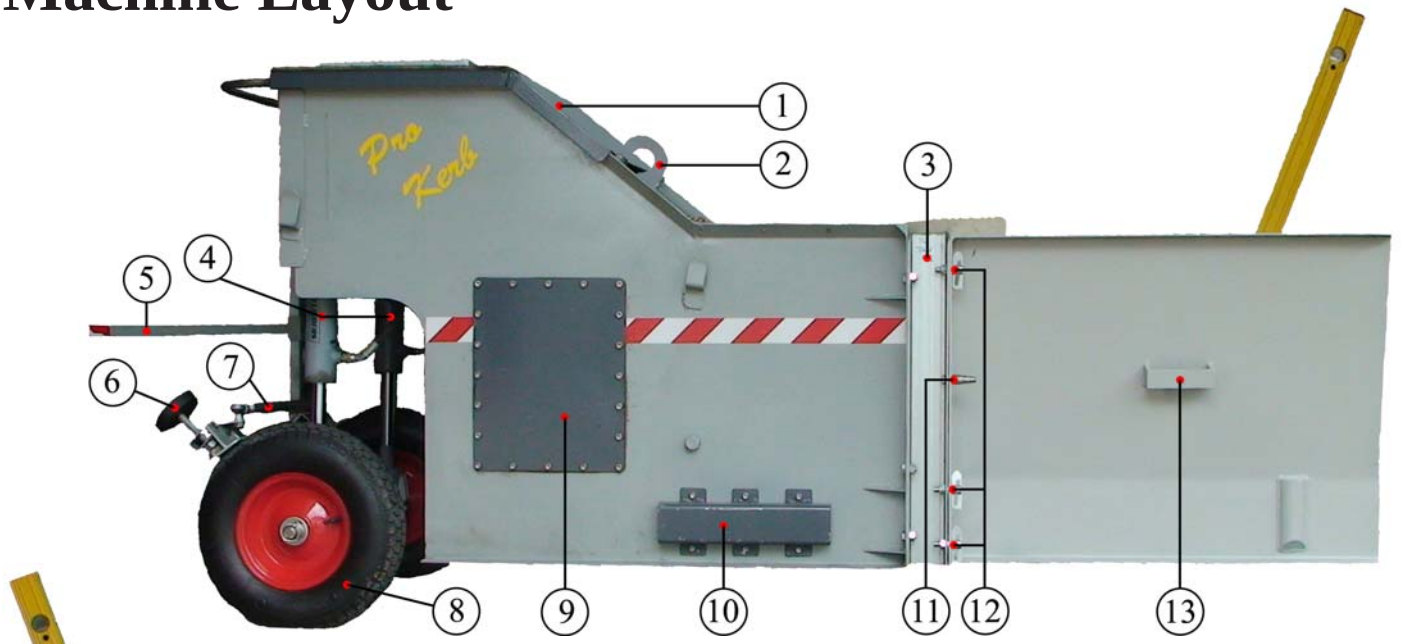
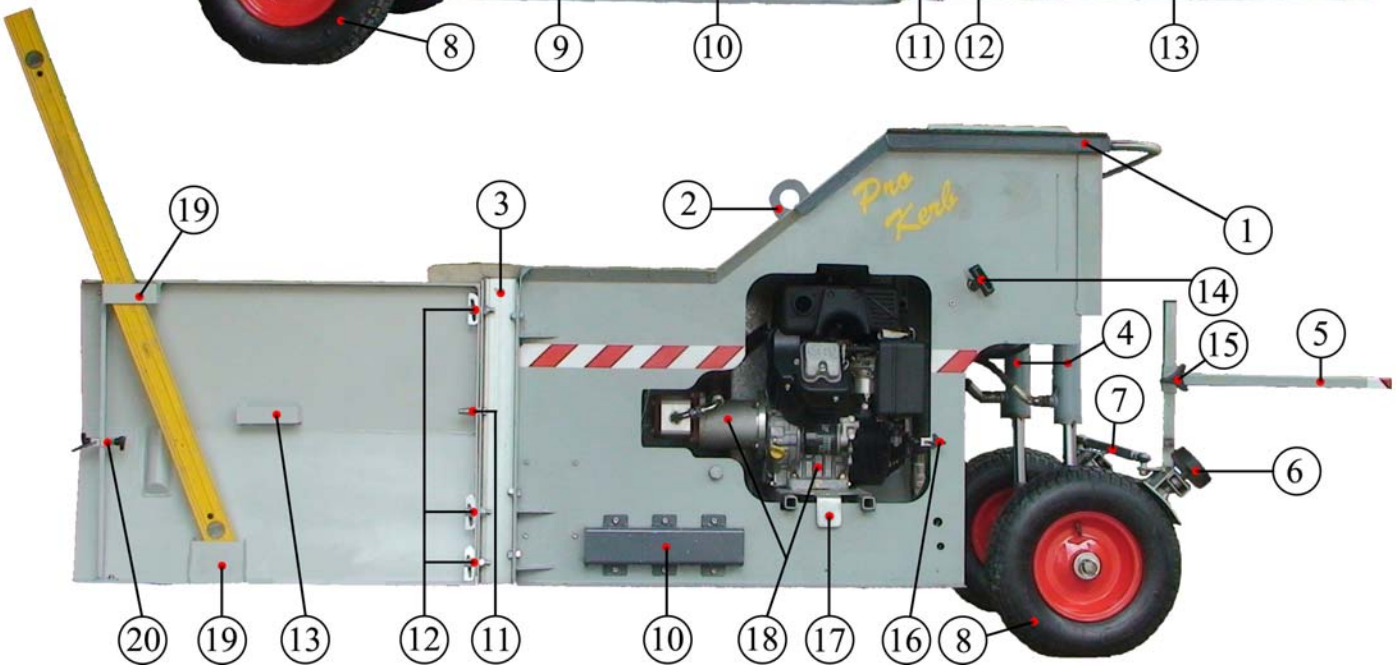
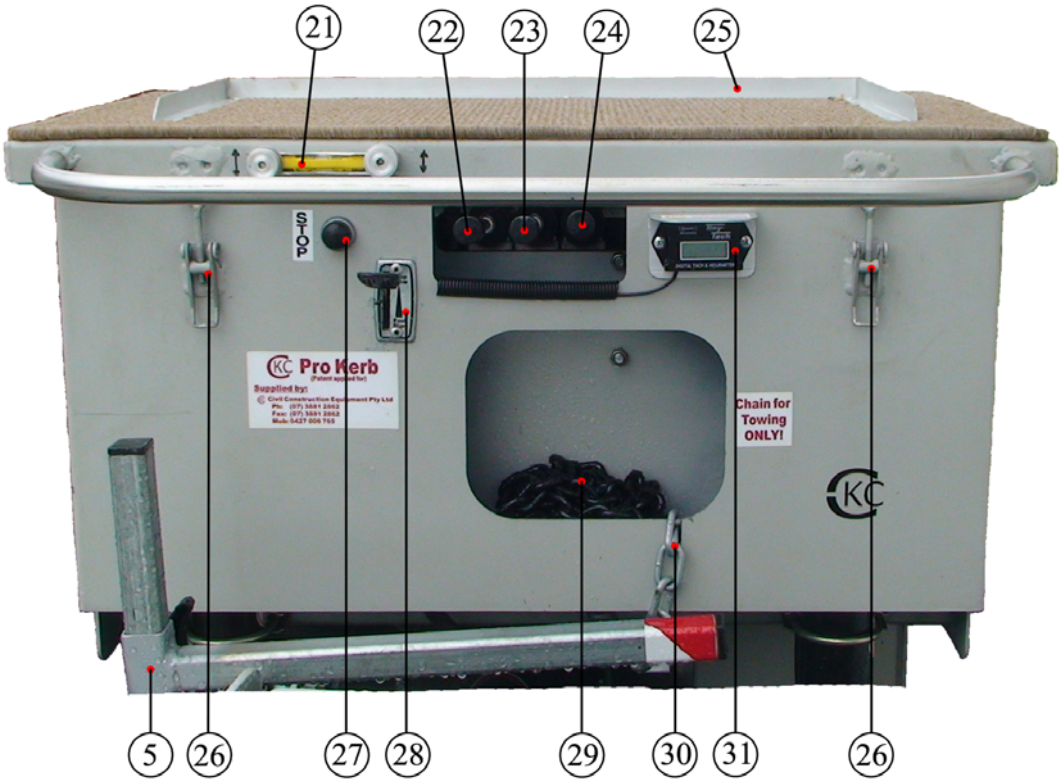
Machine Layout







Item	Description
1	Lid
2	Lifting hook
3	Machine protection spacers for attaching mould onto
4	Hydraulic levelling cylinders
5	Steering tiller
6	Brake adjustment knobs with captive floating pad
7	Tie rod
8	Pneumatic steering wheels
9	Hydraulic tank access panel
10	Slides for pusher mounting bar
11	Mould alignment pins
12	Mould locking catches
13	Mould lifting points
14	Starting handle
15	Steering tiller height and position adjusting knob
16	String line follower
17	Engine slide locking bolt
18	Engine and hydraulic pump unit
19	Spirit level holders
20	String line follower - Not available on all moulds
21	Machine levelling bubble
22	Operating lever for left wheel
23	Operating lever for right wheel
24	Operating lever for pushing concrete through mould
25	Rail on lid to keep items from falling off
26	Lid locking catches
27	Engine stop button
28	Engine throttle lever
29	Storage area for towing chain and other items
30	Towing chain - NOT FOR LIFTING
31	Engine tacho and hour meter
32	Engine
33	Engine fuel gauge
34	Hydraulic oil filter condition gauge
35	Hydraulic tank filler cap
36	Pusher mechanism reciprocating valve
37	Hydraulic lever control valve assembly and main pressure relief valve
38	Hydraulic tank oil level gauge
39	Hydraulic oil filter assembly
40	Pusher mounting bar
41	Kicker assembly
42	Scraper plate mounting pins
43	Kicker assembly return spring mounting
44	String side replaceable wear plate
45	Bottle screw adjustment for scraper plate height
46	Hydraulic tank main valve in ON position
47	Hydraulic tank main valve in OFF position

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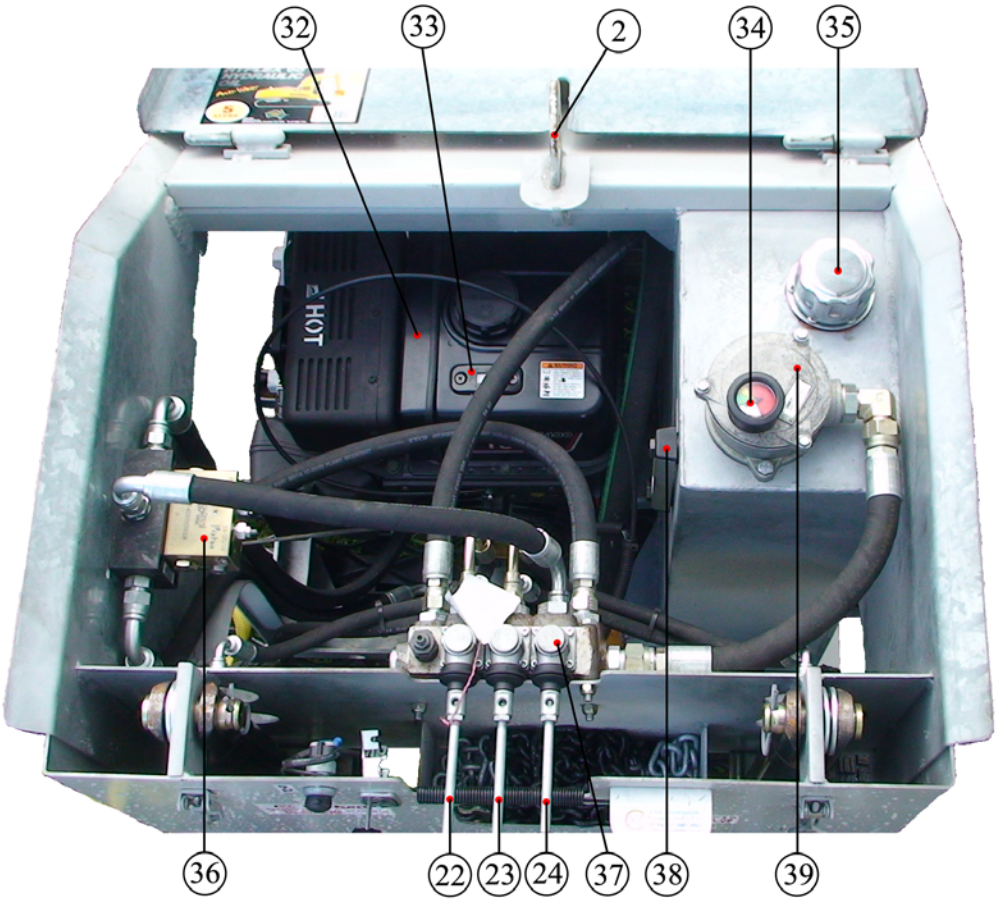
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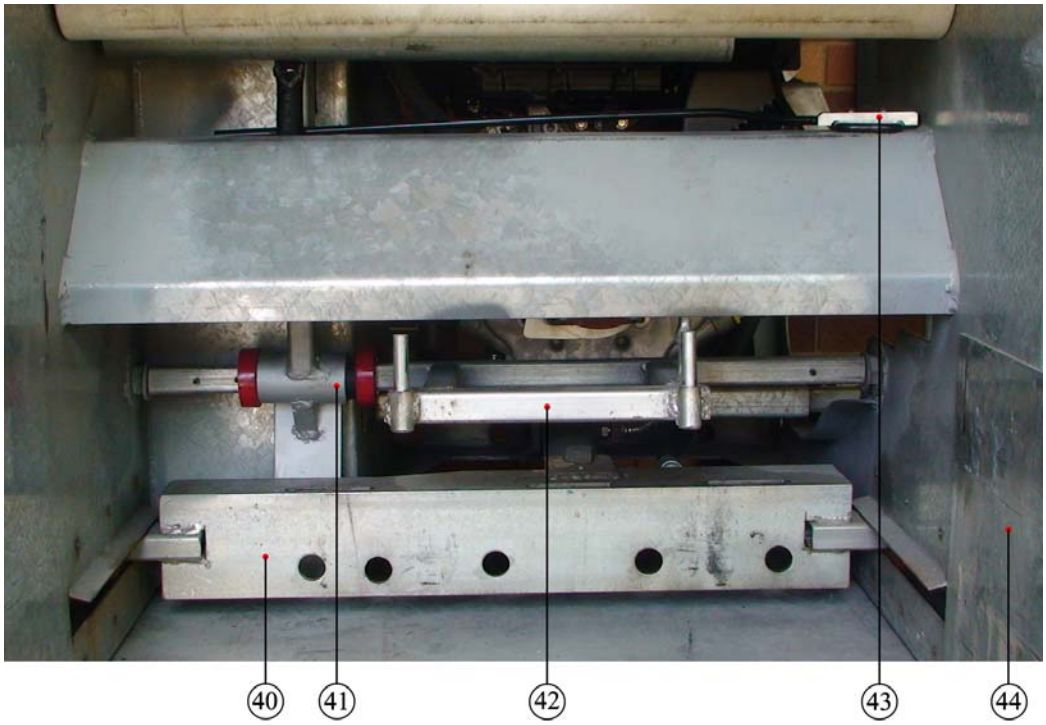
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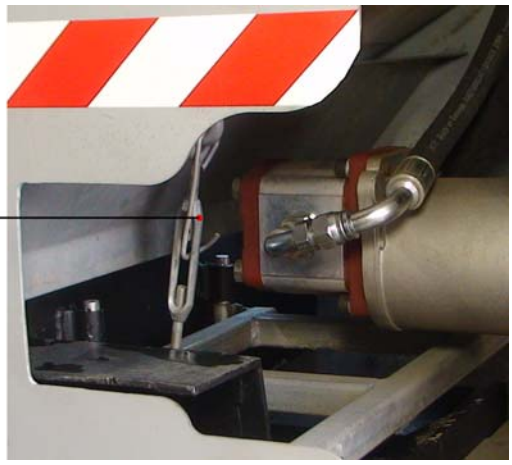
45

OFF
47

ON
46

Before Starting

1. Check there is petrol and oil in the motor - Refer to engine owner's manual for details.
2. Check hydraulic oil level using the tank gauge. (Item 38)
3. Ensure that the hydraulic oil tank valve is in the on position. (Item 46)
4. Ensure all operating levers are level prior to starting. (Items 22, 23 and 24)
5. Refer to engine owner's manual for starting instructions.

Operation

1. The right lever (Item 24) will cause the machine to operate. When all levers are level the oil goes straight back to tank and not over any pressure circuit.
2. Adjusting height. Experienced operators do this while the machine is stationary. This needs a little practice to get in time with the reciprocating valve.
3. Lateral level. Level the mould and then zero the level on the machine. (Item 21)
4. Since there is no centrifugal clutch you can run the engine at what ever speed you require but try to avoid about 2250 rpm. It is around here that most single cylinder engines vibrate the worst.
5. If you have compaction problems apply the brakes (Item 6) but this is usually needed only down hill and with the bigger moulds.
6. Adjust the string line pointer (Items 16 and 20) to suit what you are doing. If deeper kerbs than normal are specified add skids below the mould. Note – the mould has a slope built into it so the unit as a whole should run relatively level.
7. There is a captive towing chain (Item 30) located in the towing chain storage area (Item 29) which can be used for towing the machine past gullies and other areas where kerb is not required. This chain is NOT to be used for lifting!

Before Stopping

1. Ensure the hydraulic ram attached to the pusher plate mount (Item 40) is fully retracted. This will prevent any damage to the hydraulic ram shaft should the machine be lowered onto anything while being moved.
2. Ensure the hydraulic levelling rams (Item 4) are at the required height.
3. Press and hold the Stop button (Item 27) until the engine has stopped completely.

Mould Changes

Slot pusher plate into pusher plate mounting bar. (Item 40)

Slide scraper plate onto scraper plate mounting pins. (Item 42)

Adjust the height of the scraper plate using the scraper plate adjustment bottle screw (Item 45) so that the scraper plate is just above the pusher plate. The piece of wire is to prevent the bottle screw from self adjusting due to vibration.

Slide mould into position using the mould alignment pins (Item 11)

Once correctly located against the machine protection spacers (Item 3) flick the locking catches (Item 12) into the vertical position.

Reverse the above procedure to remove the current mould.

The above procedure does take a little practice to get right but with the help of a regular hammer and pry bar the entire mould change procedure can be completed by two people in under 2 minutes without the need for any spanners.

The machine protection spacers (Item 3) should never need to be removed from the machine.

Specifications

Item	Description
Width	820mm
Height	960mm
Length	Machine - 1600mm Mould - 875mm Overall with mould - 2475mm
Weight	Machine - 310Kg Mould - 150Kg
Engine	13hp 4 stroke
Pump	Salami
Levelling Ram	Nordon Industrial Grade with 14" stroke
Pusher Ram	Nordon Excavator Grade with 8" stroke
Min kerb radius	1000mm
Max kerb size	700mm wide

Servicing and Maintenance

Engine maintenance is as per owner's manual. Please consult this documentation for further information. To perform maintenance on the engine undo the engine slide locking bolt (Item 17) and slide the engine out.

When	Item	Check
Daily	Item 4	Check for any seepage which could indicate a oil leak.
Daily	Item 8	Ensure correct pressure and tyre condition.
Daily	Item 10	Ensure no blockages or debris in slide mount and that the ram mount (Item 40) is not making metal to metal contact with the machine frame. As the metal channel will wear out prior to the urethane block it has been designed to that the metal channel can be inverted and reused prior to complete replacement of channel.
Weekly	Item 14	Check pull start cable to ensure good condition.
Weekly	Item 28	Ensure free movement of throttle level. Should this become stiff drop some standard light oil down the cable located behind the lever.
Weekly	Item 34	Check this gauge to determine when hydraulic oil filter needs to be replaced. This needs to be done with the engine running at medium revs.
Weekly	Item 44	Ensure that wear plate has not worn through to the machine body.
Various	Item 18	Perform checks as specified in the engine owner's manual. Hydraulic pump unit does not need servicing.
Various	Item 32	Perform checks as specified in the engine owner's manual. Hydraulic pump unit does not need servicing.

Troubleshooting

If the hydraulics ever jam up there is a little stimulator on the reciprocating valve (Item 36). Push it one way or the other and the valve will resume. The stimulator is located in the front and rear face of the valve in the centre of the large bolt head.

The pressure settings for the reciprocating valve (Item 36) are facing inwards and need a 10mm spanner and an allen key to adjust. They determine the pressure at which the cylinder changes direction. If for some reason it changes too soon the pressure needs increasing by screwing the adjusting screw in. Give it only sufficient pressure to do its work. The main pressure setting is on the valve block (Item 37) and is set at 1000psi. The reciprocating pressures are approximately 400 and 500 psi but it is very hard to judge this with an analogue gauge. Generally if you have trouble it is something in the works such as a solid piece of dried concrete or something else. Before making any of the above mentioned adjustments please call us for the latest advice.

The point for testing pressures is located on the lower string side of the machine on the main valve block (Item 37). The system relief valve is located on the string side of the machine on top of the main valve block (Item 37).

On a new machine the slides (Item 10) may bind. To resolve this just spray some water in them. Once the machine has done some hours work this will no longer happen.

Engine Owners Manual

Kawasaki

FE250/FE290/FE350/FE400

4-Stroke air-cooled gasoline engine

OWNER'S MANUAL

Part No. 99920-2124-08

READ THIS FIRST

For your safety, read this Owner's Manual and understand it thoroughly before operating this ENGINE.

⚠WARNING

- Never allow children to operate the engine or equipment.
- Keep people and pets out of area where you are using the engine or equipment.
- Never wear loose, torn, or bulky clothing. It may catch on moving parts or controls, leading to the risk of accident.
- Never consume alcohol or drug before or while operating this engine.
- Do not run the engine in a closed area. Exhaust gas contains carbon monoxide, an odorless and deadly poison.
- Gasoline is extremely flammable and can be explosive under certain condition.
  - Stop engine and allow the engine to cool before refueling.
  - Do not smoke. Make sure area is well ventilated and free from any source of flame or sparks including the pilot light of any appliance while refueling, servicing fuel system, draining gasoline and/or adjusting carburetor.
  - Do not fill the tank so the fuel level rises into the filler neck or level surface of level gauge. If the tank is overfilled, heat may cause the fuel to expand and overflow through the vents in the tank cap.
  - Wipe off any spilled gasoline immediately.
- To prevent fire hazard:
  - Keep the engine at least 1 m (3.3 ft) away from buildings, obstructions and other burnable objects.
  - Do not place flammable objects close to the engine.
  - Do not expose combustible materials to the engine exhaust.
  - Do not use the engine on any forest covered, bush covered or grass covered unimproved land unless spark arrester is installed on the muffler.
- To avoid getting an electric shock, do not touch spark plug, plug cap or spark plug lead during engine running.
- To avoid a serious burn, do not touch a hot engine or muffler. The engine becomes hot during operation. Before you service or remove parts, stop engine and allow the engine to cool.
- Do not place hands or feet near moving or rotating parts.
- Do not run engine at excessive speeds. This may result in injury.
- Always remove the spark plug lead from spark plug when servicing the engine to prevent accidental starting.

SAFETY AWARENESS

Whenever you see the symbols shown below, heed their instructions!
Always follow safe operating and maintenance practices.

⚠WARNING

This warning symbol identifies special instructions or procedures which, if not correctly followed, could result in personal injury, or loss of life.

CAUTION

This caution symbol identifies special instructions or procedures which, if not strictly observed, could result in damage to, or destruction of equipment.

NOTE

○ *Indicates points of particular interest for more efficient and convenient operation.*

FOREWORD

We wish to thank you for choosing this Kawasaki Engine. Please read this Owner's Manual and understand thoroughly before operating, as it contains information which will be of value in obtaining maximum service from your Kawasaki Engine. To ensure a long, trouble-free life for your engine, give it the proper care and maintenance described in this manual.

○ Due to improvements in design and performance during production, in some cases there may be minor discrepancies between the actual engine and the illustrations or text in this manual.

The right is reserved to make changes at anytime without notice.

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READ THE OPERATING INSTRUCTIONS OF THE EQUIPMENT THIS ENGINE POWERS.

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(8) : June 2006 (M)

EMISSION CONTROL INFORMATION

Fuel Information

THIS ENGINE IS CERTIFIED TO OPERATE ON UNLEADED REGULAR GRADE GASOLINE ONLY.
A minimum of 87 octane of the antiknock index is recommended. The antiknock index is posted on service station pumps in the U.S.A.

Emission Control Information

To protect the environment in which we all live, Kawasaki has incorporated an exhaust emission control system in compliance with applicable regulations of the United States Environmental Protection Agency and the California Air Resources Board. Also, depending on when your engine was produced, it may have an assigned emissions durability period. * See below for the engine emissions durability period that may apply to your engine.

Exhaust Emission Control System

The exhaust emission control system applied to this engine consists of a carburetor and an ignition system having optimum ignition timing characteristics. The carburetor has been calibrated to provide lean air/fuel mixture characteristics and optimum fuel economy with a suitable air cleaner and exhaust system.

A sealed-type crankcase emission control system is also used to eliminate blow-by gasses. The blow-by gasses are led to a breather chamber through the crankcase and from there to the air cleaner.

Engine Emissions Compliance Period

California
Engines 66 cc – 225 cc
Model Year – 2002 and later Horizontal Crankshaft
Durability Period – 500 hours

Model Year – 2006 and later Vertical Crankshaft
Durability Period – 500 hours

All Other States
Engines less than 66 cc
Model Year – 2001 and later
Durability Period – 300 hours (Category A)
Engines 66 cc – 99 cc
Model Year 2001 and later
Durability Period – 500 hours (Category A)
Engines 100 cc – 225 cc
Model Year – 2003 and later (new)
2007 and later (carry over)
Durability Period – 500 hours (Category A)

California
Engines Greather Than 225 cc
Model Year – 2002 and later
Durability Period – 500 hours

All Other States
Engines Greather Than 225 cc
Model Year – 2001 and later
Durability Period – 1,000 hours (Category A)

*** If your engine has an assigned emissions durability period it will be located on the certification label attached to the engine (IMPORTANT ENGINE INFORMATION).**

High Altitude Performance Adjustment Information

To improve the EMISSIONS CONTROL PERFORMANCE of engines operated above 3,300 feet (1,000 meters) , Kawasaki recommends the following Environmental Protection Agency (EPA) and California Air Resources Board (CARB) approved modifications.

NOTE

○ *When properly performed, these specified modifications only are not considered to be emissions system "tampering" and engine performance is generally unchanged as a result.*

Installation Instructions:

High altitude adjustment requires replacement of carburetor main jets. Installation of these optional parts may be performed by an authorized Kawasaki dealer, or the consumer, following repair recommendations specified in the appropriate Kawasaki Service Bulletin.

Maintenance and Warranty

Proper maintenance is necessary to ensure that your engine will continue to have low emission levels. This Owners Manual contains those maintenance recommendations for your engine. Those items identified by the Periodic Maintenance Chart are necessary to ensure compliance with the applicable standards.

As the owner of the engine, you have the responsibility to make sure that the recommended maintenance is carried out according to the instructions in this Owners Manual at your own expense.

The Kawasaki Limited Emission Control System Warranty requires that you return your engine to an authorized Kawasaki dealer for remedy under warranty. Please read the warranty carefully, and keep it valid by complying with the owner's obligations it contains.

Tampering with Emission Control System Prohibited

Federal law and California State law prohibit the following acts or the causing thereof: (1) the removal or rendering inoperative by any person other than for purposes of maintenance, repair, or replacement, of any device or element of design incorporated into any new engine for the purposes of emission control prior to its sale or delivery to the ultimate purchaser or while it is in use, or (2) the use of the engine after such device or element of design has been removed or rendered inoperative by any person.

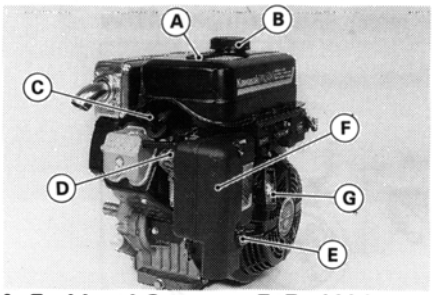
Among those acts presumed to constitute tampering are the acts listed below:

Do not tamper with the original emission related parts.

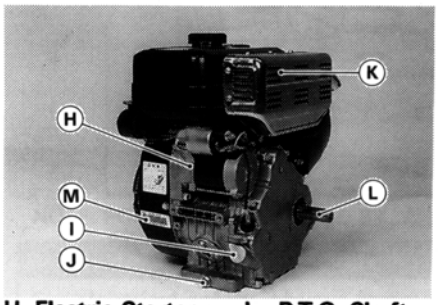
- Carburetor and internal parts
- Spark Plugs
- Magneto or electronic ignition system
- Fuel filter element
- Air cleaner element
- Crankcase
- Cylinder head
- Breather chamber and internal parts
- Intake pipe and tube

GENERAL INFORMATION

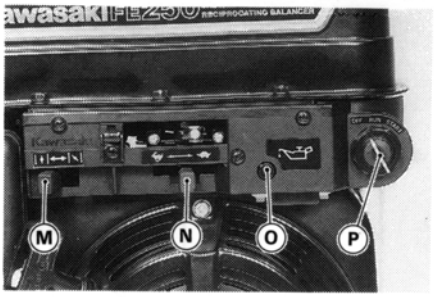
Engine Profile



A. Fuel Level Gauge
B. Fuel Tank Cap
C. Spark Plug
D. Carburetor
E. Fuel Valve
F. Air Cleaner
G. Recoil Starter



H. Electric Starter
I. Oil Gauge
J. Oil Drain Screw
K. Muffler
L. P.T.O. Shaft
M. Engine Serial Number



M. Choke Lever
N. Speed Control Lever (Throttle)
O. Oil Warning Lamp (LED)
P. Key Switch (for Electric Start Model)

Engine Serial Number

The engine number is only means of identifying your particular engine from others of the same model type. This serial number is needed by your dealer when ordering parts.

Fuel Tank Capacity

FE250	5.1 L (1.4 U.S. gal.)
FE290	5.8 L (1.5 U.S. gal.)
FE350, 400	6.2 L (1.6 U.S. gal.)

Engine Oil Capacity

FE250, 290 without oil filter	1.1 L (1.1 U.S. qt)
FE290, 350, 400 with oil filter	1.3 L (1.3 U.S. qt)

Tune-up Specifications

ITEM	Specification
Valve Clearance *	IN 0.12 mm (0.0047 in.) EX 0.12 mm (0.0047 in.)
Ignition Timing	Unadjustable
High Idle Speed	3000~4000 rpm
Low Idle Speed	1300 rpm
Spark Plug Gap	0.7~0.8 mm (0.028~0.032 in.)
Other Specifications	NO OTHER ADJUSTMENT NEEDED

*: The FE350, FE400 has the hydraulic lash adjuster which automatically eliminates all lash in the valve gear.

NOTE

○ *High and low idle speeds may vary depending on each equipment on which the engine is used. Refer to the equipment specification.*

FUEL AND OIL RECOMMENDATIONS

Fuel

Use only clean, fresh, unleaded regular grade gasoline.

Octane Rating

The octane rating of a gasoline is a measure of its resistance to "knocking". Use a minimum of 87 octane of the antiknock index is recommended. The antiknock index is posted on service station pumps in the U.S.A..

NOTE

○ *If "knocking or pinging" occurs, use a different brand of gasoline or higher octane rating.*

CAUTION
Do not mix oil with gasoline.

Oxygenated Fuel

Oxygenates (either ethanol or MTBE) are added to the gasoline. If you use the oxygenated fuel be sure it is unlead and meets the minimum octane rating requirement.

The following are the EPA approved percentages of fuel oxygenates.

ETHANOL : (Ethyl or Grain Alcohol)
You may use gasoline containing up to 10% ethanol by volume.

MTBE : (Methyl Tertiary Butyl Ether)
You may use gasoline containing up to 15% MTBE by volume.

METHANOL : (Methyl or Wood Alcohol)
You may use gasoline containing up to 5% methanol by volume, as long as it also contains cosolvents and corrosion inhibitors to protect the fuel system.

Gasoline containing more than 5% methanol by volume may cause starting and/or performance problems. It may also damage metal, rubber, and plastic parts of your fuel system.

⚠WARNING
Gasoline is extremely flammable and can be explosive under certain conditions. Turn the engine switch OFF. Do not smoke. Make sure the area is well ventilated and free from any source of flame or sparks; this includes any appliance with a pilot light. Never fill the tank so the fuel level rises into the filler neck. If the tank is overfilled, heat may cause the fuel to expand and overflow through the vents in the tank cap.

⚠WARNING
After refueling, make sure the tank cap is closed securely. **If gasoline is spilled on the fuel tank wipe it off immediately.**

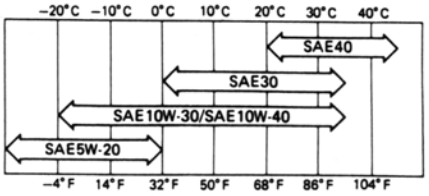
Engine Oil

The following engine oils are recommended.

API Service Classification : SF, SG, SH, or SJ.

Oil Viscosity

Choose the viscosity according to the temperature as follows:



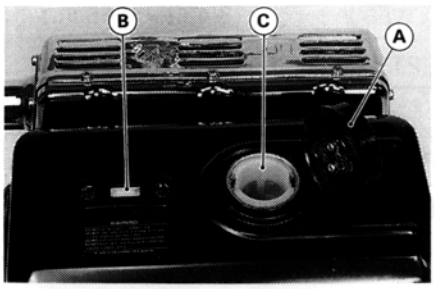
NOTE

○ *Using multi grade oils (5W-20, 10W-30, and 10W-40) will increase oil consumption. Check oil level more frequently when using them.*

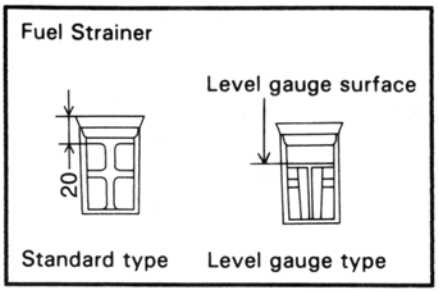
PREPARATION

Fuel

- Level the engine before fueling.
- Remove the fuel tank cap.
- Slowly pour fuel into the tank through the fuel strainer.



A. Fuel Tank Cap **C. Fuel Strainer**
B. Fuel Level Gauge



⚠WARNING

Do not fill the fuel till it reaches the fuel tank tap. The fuel may be emitted from the breather hose of the fuel tap. The reason is why the volume of fuel will be inflated because of the high temperature generated by the heated tank. Fill the fuel up to 20mm remaining from the top if employing the standard one. Do not fill the fuel exceeding the level surface if employing the strainer with level gauge graduated.

- Close the tank cap securely by turning it clockwise as far as it will go.

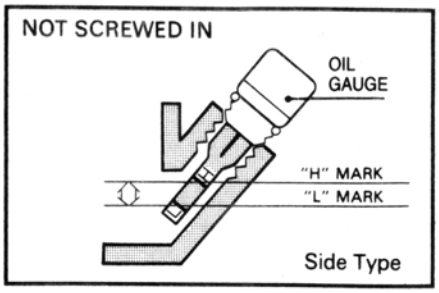
Engine Oil

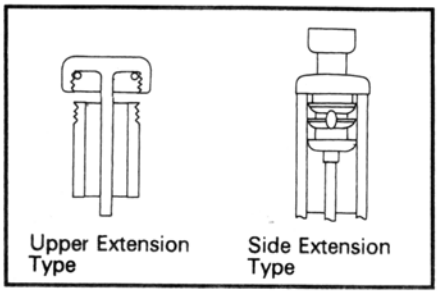
Check oil level daily and before each time of operation. Be sure oil level is maintained.

- Level the engine to ensure accurate inspection and to prevent overfilling.
- Unscrew the oil gauge, wipe its dipstick dry, and insert it into the filler hole but DO NOT SCREW IT IN.
- The oil level should be between the "H" and "L" marks on the dipstick.

CAUTION

The engine is shipped without engine oil.





Engine Oil Capacity

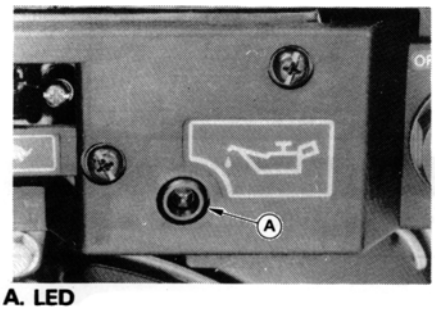
FE250, 290 without oil filter	1.1 L (1.1 U.S. qt)
FE290, 350, 400 with oil filter	When changing oil filter 1.3 L (1.3 U.S. qt)
	New engine and without changing oil filter 1.1 L (1.1 U.S. qt)

STARTING

Low oil level sensor system

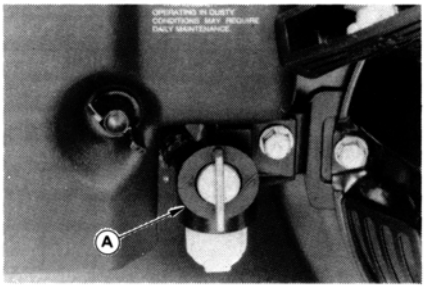
The low oil level sensor system has two types.

- On the engine stop type, the engine stops and LED flashes when the oil level gets too low. The engine don't restart without adding oil. If the engine is tilted too much during operation, it may suddenly stop even though the oil level is not too low. This might happen if it were mounted on a moving piece of machinery, such as a cultivator.
- On the alarm indicating type, the lamp comes on if the oil level gets too low with the engine still running.
  If this happens, level the engine and check the oil level. Refill with oil as needed before restarting the engine.



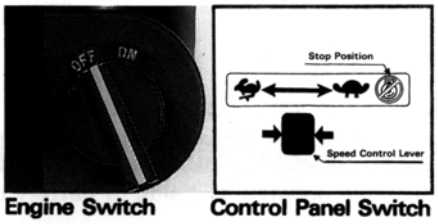
A. LED

- Always level the engine when starting.
- Open the fuel valve.



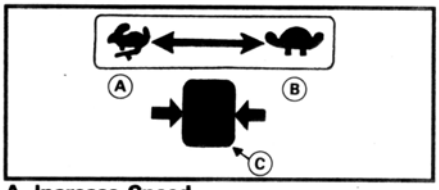
A. Fuel valve

- Turn the engine switch "ON".
  For Control Panel Switch Type, move the speed control lever to its halfway position.
  Moving the lever away from the stop position turns the ignition "ON".



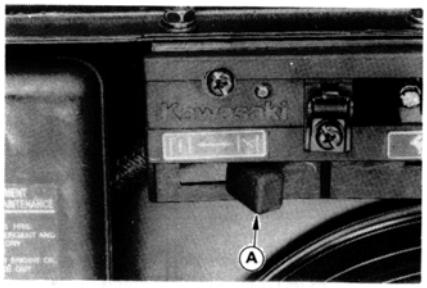
Engine Switch **Control Panel Switch**

- Move the speed control lever (throttle) to its halfway position between low speed (turtle mark) and high speed (rabbit mark).



A. Increase Speed
B. Decrease Speed
C. Speed Control Lever (Throttle)

- Move the choke lever to the full-shut position.



A. Choke Lever

NOTE

- *No relation with season or atmosphere temperature.*

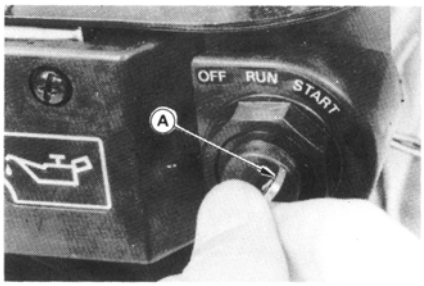
NOTE

○ *After starting, move the choke lever to the full-open position gradually.*
○ *When the engine is started after warming up once, keep the choke lever at full-open or half-open position.*

Starting by Electric Starter

- Put the switch key into the engine switch.
- Turn the switch key to the START position on the equipment. Usually the engine will start within 3 seconds.

CAUTION
Do not run the starter continuously more than 5 seconds, otherwise the battery may discharge quickly. If the engine does not start right away, wait 15 seconds and try again.



A. Key Switch

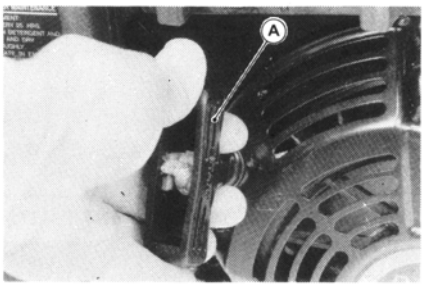
Starting by Recoil Starter

- Pull the starter cord slowly until you feel compression, then pull it briskly.

CAUTION
DO NOT let the recoil cord snap back by itself. This may damage the cord or the recoil starter assembly.

NOTE

○ *If the engine won't start in three pull, open the choke and try again.*



A. Recoil Starter Grip

OPERATING

Anti-engine inclination

This engine will operate continuously at angles up to 15° in any direction.

Refer to the operating instructions of the equipment this engine powers. Because of equipment design or application, there may be more stringent restrictions regarding the angle of operation.

CAUTION
Do not operate this engine continuously at angles exceeding 15° in any direction. Engine damage could result from insufficient lubrication.

Warming Up

- After the engine starts, let it run for 3 to 5 minutes at low speed.

CAUTION
Keep warming up before loading. This will allow oil to reach all the engine parts, and the piston clearance to reach design specification, before the engine is ready for loading.

STOPPING

⚠WARNING
Always remove Engine Key from switch when leaving equipment unattended or when equipment is not in use.

Ordinary Stop

- Lower the engine speed to an idle. Keep on running at idle for about one minute.

CAUTION
Do not stop the engine from high speed loaded operation. It may cause run-on or after burning.

- Turn the engine switch or the key switch to "OFF" position.

For Control Panel Switch Type, move the speed control lever to "OFF" position.

Emergency Stop

- Immediately turn the engine switch or the key switch to "OFF" position.
- Close the fuel valve on the equipment.
- Turn the engine switch or the key switch to "OFF" position.

For Control Panel Switch Type, move the speed control lever (throttle) on the equipment to its low speed end. Moving the lever (throttle) to its low speed end turns ignition off.

Stop for Long Period

- If you do not expect to use the engine again for a long period of time, close the fuel valve and let the engine run out of fuel before turning the engine switch or the key switch to "OFF".

For Control Panel Switch type, move the speed control lever (throttle) to "OFF" position.

- Leave the fuel valve closed.

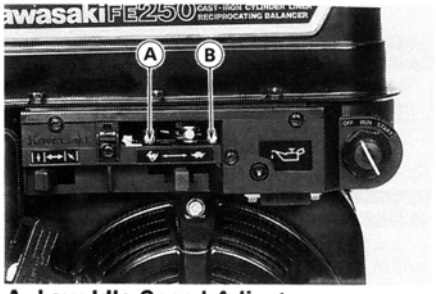
CAUTION
DO NOT leave the engine with gasoline in the carburetor for long period. This could cause difficult starting, loss of power and other problems.

ADJUSTMENT

Engine Speed Adjustment

NOTE

- *Do not tamper with the governor setting or the carburetor setting to increase the engine speed. Every carburetor is adjusted at the factory and a cap or a stop plates were installed on each mixture screw.*
- *If adjustment is needed, have it performed by your authorized Kawasaki Engine dealer.*



A. Low Idle Speed Adjuster
B. High Idle Speed Adjuster

MAINTENANCE

Periodic Maintenance Chart

⚠WARNING

Always remove the spark plug cap from spark plug when servicing the engine to prevent accidental starting.

MAINTENANCE	INTERVAL						
	Daily	First 8 hr.	Every 25 hr.	Every 50 hr.	Every 100 hr.	Every 200 hr.	Every 300 hr.
Check and add engine oil. Check for loose or lost nuts and screws. Check for fuel and oil leakage. Check battery electrolyte level. Check or clean air intake screen. Tighten nuts and screws ★ Clean air cleaner foam element	● ● ● ● ●		● ●				
★ Clean air cleaner paper element					●		
Clean fuel filter element Change engine oil (without oil filter) Change engine oil (with oil filter)		● ●		● ● ●	● ●		
Clean and regap spark plug Change oil filter					● ●	● ●	
★ Replace air cleaner paper element ★ Clean dust and dirt from cylinder and cylinder head fins							● ●
K Clean combustion chamber K Check and adjust valve clearance K Clean and lap valve seating surface							● ● ●

Note: The service intervals indicated are to be used as a guide. Service should be performed more frequently as necessary by operating condition.

★: Service more frequently under dusty conditions.
K: Service to be performed by an authorized Kawasaki dealer.

Oil Level Check

Check oil level daily and before each time of operation. Be sure oil level is maintained. See PREPARATION.

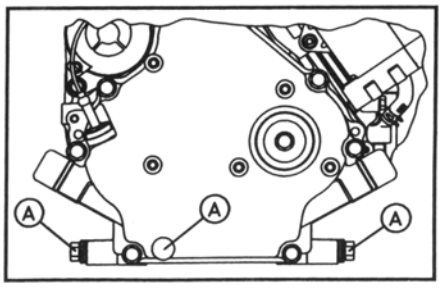
Oil Change

Change oil after first 8 hours of operation. Thereafter change oil every 50 hours (without oil filter type) and 100 hours (with oil filter type).

- Run the engine to warm oil.
- Be sure the engine (equipment) is level.
- Stop the engine.
- Remove the oil drain screw and drain the oil to suitable container while engine is warm.

⚠WARNING

Be careful with hot oil being drained. It may be hot enough to burn you severely.



A. Oil Drain Screw

- Install the oil drain screw.
- Remove oil gauge and refill with new oil (See FUEL AND OIL RECOMMENDATIONS).
- Check the oil level (see Oil Level Check).

Oil Filter Change–if equipped

- Change the oil filter every 200 hours of operation.

⚠WARNING

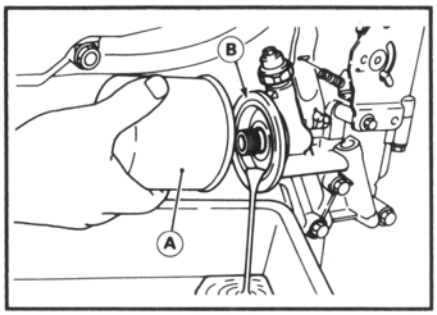
Stop the engine and be careful with hot oil drained.

- Drain engine oil to suitable containers.

CAUTION

Before removing the oil filter, place suitable pan under filter connection.

- Rotate the filter (A) counterclockwise to remove it.
- Coat a film of clean engine oil on seal of new filter.
- Install new filter rotating it clockwise until seal contacts mounting surface (B). Then rotate filter 3/4 turn more by hand.
- Supply engine oil as specified.
- Run the engine for about 3 minutes, stop engine, and check oil leakage around the filter.
- Add oil to compensate oil level down due to oil filter capacity (see PREPARATION for oil level check).



Air Cleaner Service

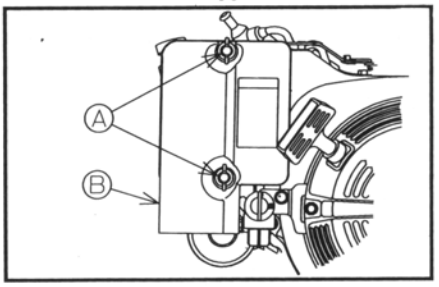
CAUTION

To prevent excessive engine wear, do not run the engine with the air cleaner removed.

⚠WARNING

Clean the elements in a well ventilated area and take care that there are no sparks or flame anywhere near the working area, this includes any appliance with a pilot light. Do not use gasoline or low flash–point solvents to clean the element. A fire or explosion could result.

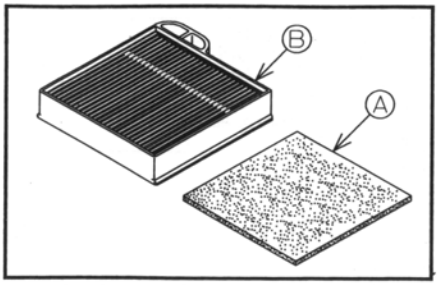
Dual Filtration Type



A. Wing Bolts B. Air Clener Cover

Lower Inhale Type

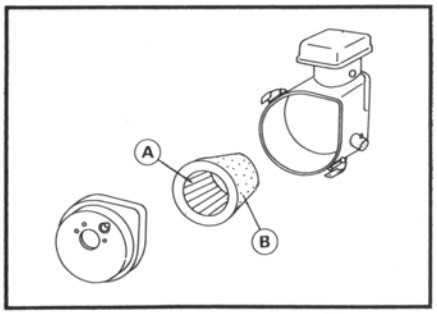
- Unscrew the wing bolts and remove the air cleaner cover, then remove the elements.
- Separate the foam element from the paper element.



A. Foam Element B. Paper Element

Upper Inhale Type

Unscrew the clamp to remove the element.



A. Paper Element B. Foam Element

Foam Element:

Clean the foam element every 25 hours.

- Wash the element in detergent and water, and dry it thoroughly.
- Soak the element in new engine oil and squeeze it to remove excess oil.

Paper Element:

Clean the paper element every 100 hours.

- Clean the element by tapping gently to remove dust. If very dirty, change the element to new one.
- Change the element every 300 hours.

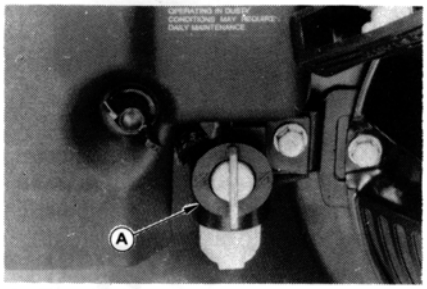
Fuel Filter Service

⚠WARNING

Clean the fuel filter element in a well ventilated area, and take care that there are no sparks or flame anywhere near the working area; this includes any appliance with a pilot light. Do not use gasoline or low flash-point solvents to clean the fuel filter element. A fire or explosion could result.

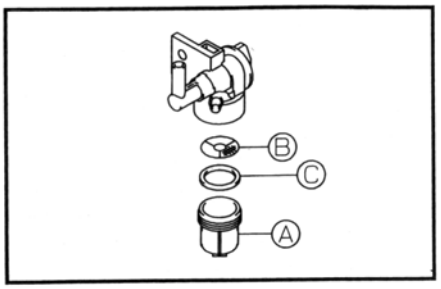
Clean the fuel filter element every 50 hours.

- Close the valve to shut off the fuel flow.



A. Fuel Valve

- Loosen the sediment bowl and remove the filter screen and gasket.
- Remove any sediment, wipe clean, and reinstall the assembly.



A. Sediment Bowl **C. Gasket**
B. Screen

Spark Plug Service

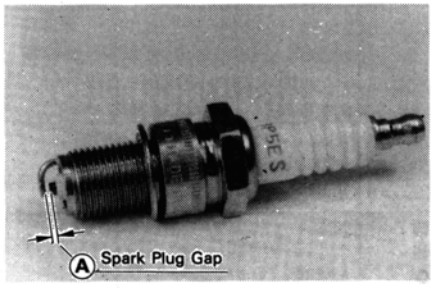
⚠WARNING

Before checking spark plug, stop the engine and allow it to cool.

Clean or replace the spark plug and reset gap (A) every 100 hours of operation.

- Disconnect the spark plug wire lead and remove the spark plug.
- Clean the electrodes by scraping with a wire brush to remove carbon deposits and wetness.
- Inspect for cracked porcelain or other wear and damage. Replace the spark plug with a new one if necessary.

- Check the spark plug gap and reset it if necessary. The gap must be between 0.7 and 0.8 mm (0.028 and 0.032"). To change the gap, bend only side-electrode, using a spark plug tool.
- Install and tighten the spark plug to 23 Nm (17 ft-lb). Then connect spark plug lead.



A. Spark Plug Gap

CAUTION

Be sure to use the same type of spark plug for change. Resistor spark plug is required in smome area by local law.

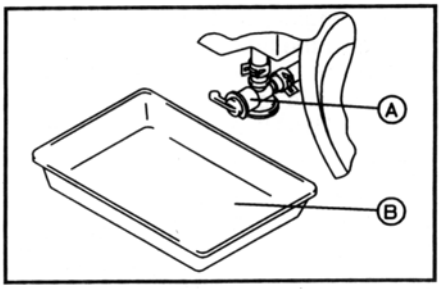
Spark Plug Recommended

Spark Plug	NGK BPR5ES
Spark Plug Gap	0.7~0.8 mm (0.027~0.031 in.)
Tighten Torque	23 N-m (17 ft-lb)

STORAGE

Follow the procedure mentioned below when the engine is kept unused for more than 30 days.

- Clean the every part of the engine.
- Be sure that the engine switch or key switch is positioned at "OFF".
- Turn the fuel valve to "OFF" and remove the sediment bowl.
- Put a pan under the fuel valve to receive the drained fuel, and turn the valve"ON" to drain the fuel from fuel tank completely.



A. Fuel Valve **B. Pan**

- Install the sediment bowl.

For drain-connected fuel valve type, position the fuel valve to the drain position.

- Tighten the fuel screw.
- Remove the spark plug and pour approx 10 cc of engine oil through the spark plug hole and then screw the spark plug in after turning the crankshaft a few times. Pull the starter cord slowly until you feel compression and then leave it there.
  - These blocks the air to come inside the cylinder and prevent the rust inside the engine.
- Change engine oil for next use after period of storage (refer to oil change).
- Wipe the body with oily cloth.
- Wrap the engine with plastic sheeting and store it in a dry place.

⚠WARNING

Drain the fuel in a well ventilated area. Keep the drained fuel in a safe area.

TROUBLESHOOTING GUIDE

If the engine malfunctions, carefully examine the symptoms and the operating conditions, and use the table shown below as a guide to troubleshoot.

Symptom		Probable Cause	Remedy
Engine won't start or output is low	Insufficient compression	Faulty piston, cylinder, piston ring, and head gasket	K
		Faulty valves	
		Loose spark plug	Tighten properly
		Loose cylinder head bolts	
	No fuel to combustion chamber	No fuel in fuel tank	Fill fuel tank
		Fuel filter not in"ON" position	Open fuel valve.
		Blocked fuel filter or tube	Clean
		Blocked air vent in tank cap	
		Faulty carburetor	K
	Spark plug fouled by fuel	Over-rich fuel/air mixture	Open choke. Rotate engine with spark plug removed to discharge excess fuel. Clean spark plug.
		Clogged air cleaner	Clean
		Faulty carburetor	K
		Incorrect grade/type of fuel	Change gasoline
		Water in fuel	
	No spark or weak spark	Faulty spark plug	Replace spark plug
		Faulty ignition coil igniter	K
		Engine switch left in "OFF" position and / or low oil level	Turn engine switch on (See **M**) or add oil.
Low output	Engine overheats	Clogged air cleaner	Clean
		Recoil starter or cooling air path clogged with dirt	
		Insufficient engine oil	Replenish or change oil
		Carbon built-up in combustion chamber	K
		Poor ventilation around engine	Select a better location
	Engine speed won't increase	Faulty governor	K

K: Have an authorized Kawasaki engine dealer perform these service.
M: For Control Panel Switch Type, move the throttle lever on the equipment away from its low speed end to turn the engine switch to "ON".

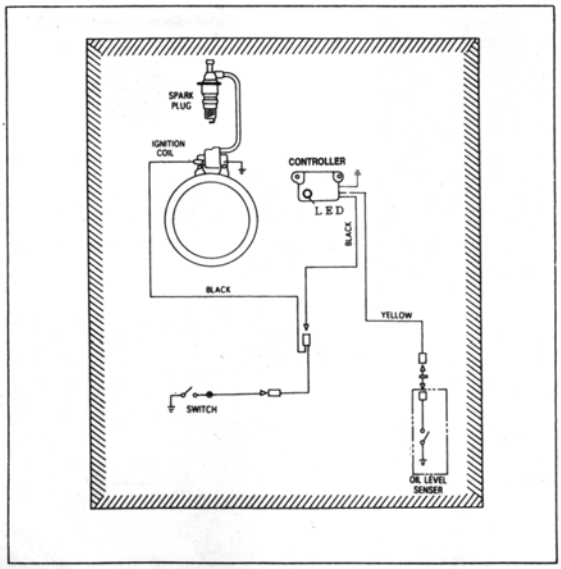
SPECIFICATIONS

	FE250	FE290	FE350	FE400
Type of engine	Air-cooled, 4-stroke OHV, Single cylinder, gasoline engine			
Bore × Stroke	76 × 55 mm (2.99 × 2.17 in.)	78 × 60 mm (3.07 × 2.36 in.)	83 × 65 mm (3.27 × 2.56 in.)	87 × 67.5 mm (3.425 × 2.66 in.)
Displacement	249 mL (15.2 cu.in)	286 mL (17.5 cu.in)	351 mL (21.4 cu.in)	401 mL (24.5 cu.in)
Ignition system	Solid-state ignition			
Direction of rotasion	Counterclockwise facing the PTO Shaft			
Starting system	Recoil or electric starter			
Dry weight	26.8 kg (59.1 lbs)	30.4 kg (67.0 lbs)	34.5 kg (76.1 lbs)	34.5 kg (76.1 lbs)

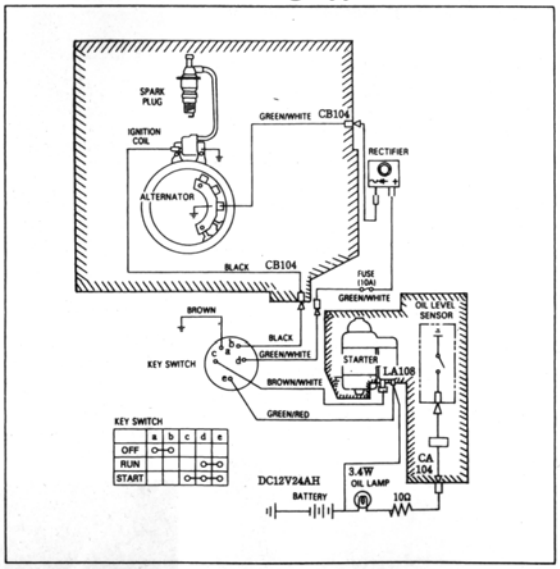
Specifications subject to change without notice

WIRING DIAGRAM

Recoil Starter Model
with engine stop type oil level sensor



Electric Starter Model
with alarm indicating type oil level sensor



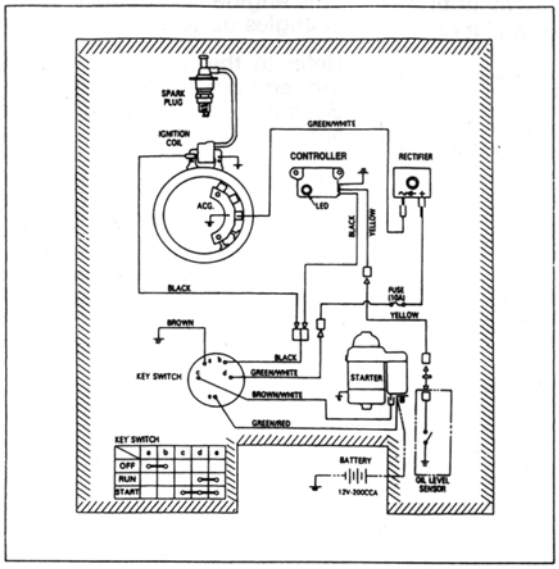
NOTE: PORTION SURROUNDED BY ////// SHOWS KAWASAKI PROCUREMENT PARTS.

⚠WARNING

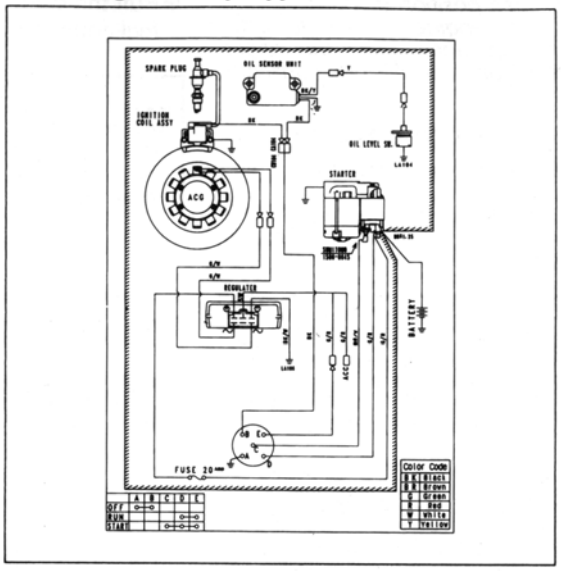
For electrical safety, always remove cable from negative (−) side of battery before attempting any repair or maintenance.

WIRING DIAGRAM

Electric Starter Model
with engine stop type oil level sensor



Electric Starter Model
with engine stop type oil level sensor



NOTE: PORTION SURROUNDED BY ////// SHOWS KAWASAKI PROCUREMENT PARTS.

⚠WARNING

For electrical safety, always remove cable from negative (−) side of battery before attempting any repair or maintenance.

⚠ WARNING: ⚠

The engine exhaust from this product contains chemicals known to the State of California to cause cancer, birth defects or other reproductive harm.

Engine oil is a toxic substance. Dispose of used oil properly. Contact your local authorities for approved disposal methods or possible recycling.

Gasoline is a toxic substance. Dispose of gasoline properly. Contact your local authorities for approved disposal methods.

Kawasaki
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Consumer Products & Machinery Company